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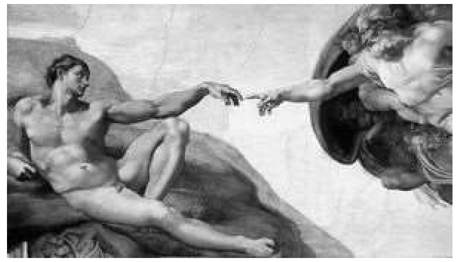
The Unified Field Theory



by Miles Mathis

It is not the arrangement of new systems, nor the
discovery of new facts, which constitutes a man of science;
but the submission to our eternal system,
and the proper grasp of facts already known.—Ruskin

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This paper is not a historical overview of failed Unified Field Theories. Nor is it a philosophical treatise on the idea of the Unified Field. Nor is it an esoteric model based on extravagant and untestable hypotheses. Nor is it the revelation of some new math, so difficult it requires large computers just to store the equations. This paper is the announcement of the Unified Field that we have always had, but not recognized. This paper is the solution of a very long mystery.

I will show that Newton's famous gravitational equation is a compound equation that expresses both the gravitational field and the E/M field. I will separate the two fields mathematically, showing the distinct equations and how they fit together. I will then do a Relativistic transform on each new field, showing that a new Relative field equation can be achieved directly without tensors or any difficult math. I will then re-unify these two Relative field equations into a Unified Field Equation, which I will show is just Newton's classical field with a simple transform.

Once that is done, I will derive the new number for *g* by novel means, showing that the gravitational acceleration—newly divorced from the acceleration caused by the charge field—must be marginally greater than 9.8. I will show that this is because the gravitational field and the charge field are in vector opposition.

As a lead-in to this solution I will show some interesting facts, so far uncompiled in the correct way, but related to the solution revealed here. The first, surprisingly enough, is a quote by Jonathan Swift. As a matter of science, Swift is most famous (or notorious) for making strange and precise statements about the moons of Mars, statements that turned out to be very near true. Somewhat less well known in our own time is a statement he made regarding gravity and his friend Newton's efforts to explain it. In *Gulliver's Travels*, on the sorcerer's island of Glubbdubdrib, Gulliver met the apparition of Aristotle, who admitted his own mistakes and predicted the same fate for others' ideas. Specifically,

He [Aristotle] predicted the same fate for ATTRACTION, whereof the present learned are such zealous asserters.

Swift lampooned the idea of attraction as being unmechanical, and went on to say that when gravity was really and truly solved, it would be by a mechanism not yet thought of by the worthies of the age.

It turns out that he was even more prescient regarding this than he was about the moons of Mars. Some have thought he must be talking about Einstein, since Einstein assigns the cause of the field to curvature, not attraction. But this cannot be true. General Relativity changes the geometry, but it does not change the

direction of the gravity vector. For Einstein the acceleration still points in, so it is still an attraction. For Einstein, massive objects curve space, and the space then impels objects in it. But for massive objects to curve space, they must act upon it in some way, and this action must be a curved attraction. Einstein has not done away with attraction, he has only cloaked it—mechanically removing it one more step.

I have shown in other papers that the only way to completely dispense with attraction is to treat gravity as a real acceleration outward. Once this is done, it allows us to define all interaction as mechanical. It also allows us to pinpoint a unified field that has existed for a long time—that existed even in Swift's day.

So far there has been some confusion as to whether this treatment of gravity as an acceleration outward is just a mathematical treatment, or whether it is physically true. I find the whole question shocking, coming from three generations of physicists who have had no trouble accepting Minkowski's math or Feynman's math, or anyone else's. They accept quantum leaps and imaginary time and infinite renormalization and dimensions curled up like pillbugs without blinking an eye, but they balk at pursuing Einstein's equivalence literally. One would come to the conclusion that they will accept anything that they and their friends think up, no matter how opaque, but nothing that an outsider thinks up, no matter how transparent.

For the past eighty years or so, the great problem in creating a Unified Field Theory has been including gravity in it. The quantum field is now the primary field in the eyes of most physicists, and the problem is writing equations that include gravity in the quantum field. That is why there is so much work now on quantum gravity. The gravitational equations that must be unified into the quantum field are the equations of Newton and Einstein, of course. Newton's equations are still considered the fundamental equations of gravity, and Einstein only fine-tunes them by taking into account time differentials. Einstein never disputed Newton's basic field assignments, he simply extended them.

But I will show that the reason Newton's and Einstein's gravitational equations cannot be imported into a unified field is that these equations already describe a unified field. Newton's equations *already* include charge and its resulting EM, and so do Einstein's. The only problem is that Newton and Einstein did not see that. Newton could not have been expected to see it, since electromagnetism was not known in his time. And no one since then has seen that his equations describe a compound force. **His equations already describe this compound force as written, with no extension and no recalibration needed.**

Before I prove this with math, I would like to show some data that pushes us where we are already going. In the 1940s the Dutch geophysicist and ocean explorer F. A. Vening Meinesz showed that gravity is very slightly stronger over deep oceans. This phenomenon has never been explained, although Vening Meinesz attributed it to continental drift and the standard model how tries to explain it as an outcome of plate tectonics and isostasy. Using the offered mechanics of isostasy and plate tectonics, the solution is both fuzzy and unverifiable. Proof would require measurement of large sections of deep earth that we simply cannot measure. And even then the postulated mechanisms are farfetched and everchanging.

The phenomenon is quite easy to explain with a single postulate, a postulate that can be tested directly in any number of ways. If what we have always called gravity is actually a compound field, then variations in that field can be explained without recourse to *ad hoc* and external theories. That is, if the force on a given object is actually a vector difference between the gravitational force and the electromagnetic force, then variations are immediately explained by variations in the electromagnetic field of the Earth—or even more directly by variations in the electromagnetic field produced by given substances.

To be specific, I will show that the gravitational force is always a force in vector opposition to the electromagnetic force, and that these two subtract to give us a resultant force. This resultant force is the one we measure and call gravity. This explains gravity at sea because seawater will be expected to have slightly less electromagnetic resistance than land masses. Seawater is a fine conductor, but it is not the same sort of *source* of E/M radiation that land is. Both conductivity and *creation* of radiation must be considered, and due to molecule density alone almost no liquid would be expected to be as strong a source of basic E/M radiation as a solid. This difference is tiny, but given deep enough water, the affect will add up and become measurable. If the electromagnetic vector is smaller, the total vector will be larger. The object will weigh more, since it is being held up by less electromagnetic bombardment.

A similar phenomenon is explained in much the same way. In the 1850s J. H. Pratt showed that the Himalayas do not exert the expected gravitational pull. They do not deflect a plumbline. This result was so surprising that the scientific world has really never gotten over it. They have never explained it either, except by more desperate theorizing. The astronomer G. B. Airy came up with the idea that there are "reverse"

Himalayas under the ones we see, buried in the sub-crust magma like a mirror image. There is no way to prove or disprove that, short of a lot more digging than we are prepared to do, but the reverse mountains wouldn't solve the problem anyway. This was basically the invention of isostasy, but isostasy doesn't solve the problem of the Himalayas. True, the plumbline would then be affected by both the upper and lower mountains, but the upper mountains should still deflect the plumbline. The whole fix is absurd and counterintuitive, since it was never thought the real mountains were sitting on a void. They were assumed to be sitting on a huge mass already, a mass called the Earth. Putting reverse mountains down there doesn't solve a thing. Even if the reverse mountains were made of gold or lead, the real mountains would still be expected to affect a plumbline, according to the given theory of gravity. The mountains have a huge mass, and talking about masses underneath is not to the point. The only new mountains that could offset the plumbline would be mountains directly behind the plumbline (assuming the real Himalayas are in front of it). Dr. Airy needed to postulate very heavy ghost mountains behind him no matter what way he turned.

The problem of the Himalayas is easy to solve once you realize that gravity is not an attraction. It is a motion. It is real acceleration, and it is a real acceleration in the direction that a real acceleration is required to create the force. That is, its direction is outward from the center of the Earth. As a matter of gravity, the Himalayas are moving up, they are not moving sideways.

Now, it is true that by this assumption all objects are expanding, not just the Earth. So the Himalayas should be expanding in all directions, too. But of course it is easy to explain why objects on the Earth are not getting closer to eachother due to this expansion. They are fixed to the Earth by roots (in the case of mountains or trees) or by friction (in the case of people and chairs and so on). And the distance between them is also expanding. The tree and I are expanding sideways, but the ground between us is, too. Since the rate of expansion is equal for all of us, there is no relative motion. The tree and I would get closer only if the ground between us was not expanding like we were. This is why we don't see this motion that causes gravity.

You will say that the plumbline is not affected by either roots or friction. It is free to swing. Am I saying that the friction of the air keeps it from deflecting toward the mountains? No, logically there would be no deflection even in a vacuum. Gravity is no longer a pulling force, it is an apparent motion caused by expansion, so deflection of this sort is impossible. There is nothing to cause it, so it does not happen. It is that simple. The real motion of the mountains is up, like everything else on Earth. That motion does not cause any sideways deflection. The only thing that was wrong was our expectation that it would.

This plumbline experiment could not have been better prepared to test the given theory of gravity, and it could not have given clearer evidence against the given theory. But the story of its reception by the scientific community is only proof that no evidence is ever strong enough to keep people from believing what they want to believe. There is always some way to come up with an absurd and untestable hypothesis that allows you to keep your old theory, no matter what your eyes or instruments tell you. For over 150 years, the standard model has refused to hear what Mr. Pratt's experiment is telling it.

[You may now go to a new paper on isostasy for more on this.]

Now that I have shown a couple of experimental proofs of my assertion, let us look at the mathematical proof. We will start with Newton's equation. Newton's famous gravity equation is a heuristic equation, and Newton admitted that from the very beginning.

$F = GMm/R^2$

Neither the numerator nor the denominator were chosen for theoretical reasons. They were chosen because they work. That is very clear with the constant G. But it is true with the mass variables, too. Newton chose to multiply them instead of add, subtract, or divide them, simply because multiplying got the right answer. He could have added the masses, for instance, and that would have given him a different value for G. But then G would not be a constant. It would vary from problem to problem. To get a constant, Newton had to multiply. This is why he multiplies; not for any theoretical reason.

The denominator is also mainly heuristic, although there was some theory there in the beginning. Newton and others could see that there was a drop off, and given the barebones theory of gravity, they could see that it needed to be exponential. Two was the first exponent to try, and it worked, so mission accomplished.

This was experimental science in the old way: run the experiments and try some equations until you found one that worked. Science still works that way, to a large extent, and no harm done. But in this case, the fact

that a heuristic equation so quickly became dogma was very bad for physics and the theory of gravity. The equation became the theory and no one ever felt it necessary to create a real theory—one that could tell us why the masses were multiplied or why the exponent of R was 2, for example. Most felt unqualified to do so, and those with the confidence apparently couldn't sort through the math and mechanics at the same time.

Below I will show that the reason the exponent is two and not three or four or any other number is simply due to the electrical field. It has nothing to do with the gravitational field. Notice for starters that despite the fact that gravity is an acceleration, and despite the fact that everyone knows that, there is no acceleration in Newton's equation. Not only that, there is no distance variable in the numerator and no time variable in the denominator. How do we get a force given no acceleration, especially considering that Newton himself defined force in terms of acceleration? It is very strange if you think about, but fortunately for Newton and the physics of gravity, most people have never thought about it.

Here's another thing that most people never notice. Thanks to Einstein and others, we know that time and distance are equivalent and interchangeable, in many ways. From Special Relativity, we know that the two variables change inversely, one getting bigger as the other gets smaller (in transforms). And more than that, we know that in rate of change problems—even when there is no transform—a time variable in a denominator can act the same way a distance variable acts in a numerator. Knowing this, we could actually rewrite the radius in Newton's equation as a time. If we rewrote the radius as the time it takes light to travel between the objects, we would skip directly to a sort of Einsteinian gravitational equation, without the tensors. I will do just that below, proving that Newton's equation can be "Relativized" without fancy equations and curved fields and long matrix derivations.

You will say, "All very interesting, I am sure, but what does this have to do with a unified field?" I am just showing you how Newton's equation can be analyzed, to prepare you for greater discoveries. Just as we have analyzed the denominator, we can analyze the numerator, discovering things that no one has seen before us.

If force is really due to acceleration and mass alone, as Newton said (and as I still accept), we shouldn't expect the gravitational equation to look like it does. For one thing, we seem to have more force than we have mass capable of producing it. We have a mass times a mass, which is always going to be more than a mass plus a mass. How can we have more mass in our equation than we have in our field? It doesn't make sense. Then we have a distance in the denominator instead of the numerator. In the basic force equation

$$F = ma = ms/t^2$$

the distance is in the numerator. Again, somewhat strange. But strangest of all is the constant G, a tiny number with lots of mysterious parameters.

$$G = 6.67 \times 10^{-11} m^3/kgs^2$$

[This value comes from Cavendish, but Newton knew a ballpark figure for the constant.] Talk about a fudge. The variables in Newton's equation don't even come close to giving us a force without a gigantic juggling of dimensions. Even worse than that is the fact that G is so very tiny. If it were just a matter of squaring up incommensurate initial definitions, as I say (somewhat obliquely) in another paper, then G would be fairly close to one. Kilograms, meters, and seconds are not 11 orders of magnitude away from eachother. Why do we need a constant that squashes our number to such a huge extent? Without the constant, our force would be 11 orders of magnitude too large. What does it all mean?

These questions and any like them were asked precious little in Newton's own time and are not asked now at all. In Newton's time, no answers were forthcoming, either from Newton or from his critics. Critics like Bishop Berkeley could describe some of the mysteries of the equation, but he could not solve them.

Notice for a start that one thing that G does is jettison one of the mass dimensions. This means that the final answer needs the extra number we get from the second mass, but it doesn't need the extra dimension. The equation likes the extension of the mass, but it doesn't like the fact that it is a mass. It wants the number but not the kilogram. The equation also wants the length dimension in the numerator, not in the denominator, and again the constant takes care of that. And we have time in the final answer, although it was not measured in the field.

That may be the strangest thing of all. We don't measure time or even have a variable for it in our equation, but we achieve it in our answer.

What could it mean?

What it means is that the equation Newton has sprung on us—a heuristic equation with almost no theory underneath it and even less explanation of the variables and constants—is a compound equation. It is a compressed result of several other more basic equations, equations that Newton could not tease out of it. No one else has ever been able to tease them out either.

I have already done part of the teasing work in my paper on the Universal Gravitational Constant. There I show that part of the dirty work G does is in allowing Newton to create a dimension called mass. Newton gives the dimensions he should have given to mass, and gives them to G instead. So the first thing we can do in our housecleaning is dump that *ad hoc* dimension m, returning to length and time. Maxwell showed in one of his papers* that mass can be expressed as $\text{length}^3/\text{time}^2$ (L^3/T^2), and if we do that then G loses most of its mystery. G loses all its dimensions, and force is then L^4/T^4 or $(V^2)^2$. Force becomes a velocity squared squared.

Still, why multiply the masses? In the equation F = ma, we have the same sort of problem. We have a mass times a length, but what is a kilogram times a meter? It is not a kilogram working through a meter, as in a Joule; it is a kilogram times a meter, as if the two dimensions are equivalent. Well, Maxwell's dimensions would imply that they are equivalent, even more than the meter and the second are equivalent in Relativity. The absolute speed of light does not give us the equivalence of mass and distance; no, they seem to be dimensionally equivalent in a different sense than that. By Maxwell's dimensions, mass looks like motion in three dimensions. It is a length over a time. More like a velocity or an acceleration, but still, directly comparable to length, and therefore capable of being multiplied by it in a sensible fashion. And if we treat mass as a three-dimensional acceleration, then force becomes a velocity squared squared. All very suggestive, as I think you will admit.

But where can we take this suggestion? I have already proposed that the electromagnetic force is expressed in Newton's equation, so the smartest thing to do is see if we can subtract it out directly.

And here we come across the other problem, since we have reached the halfway mark and are now meeting the problem from the other end. What I mean is that the E/M field equations are exactly like Newton's equation. They already express a unified field without being aware of it. Classically, the equation for electrostatic force is the same as Newton's equation, substituting charge for mass and using a different constant.

$$E = kQq/R^2$$

This is no accident, since this is another heuristic equation. Like Newton's equation, it has existed for centuries with little or no underlying theory or full explanation of variables.

More than this, QED is in the same boat. It has created a much more extensive and useful set of equations, but at bottom it is also a unified field. QED now resists being unified with gravity, and this is due to the fact that it already contains gravity without knowing it.

What we need is not a unified field; what we need is a segregated field. We don't need to bring the two forces together, we need to separate them. Only then can we re-unify them with full understanding.

QED suffers from the opposite problem of Newton and Einstein, since in quantum mechanics gravity is the small effect that needs to be teased out of the larger one. With Einstein's and Newton's equations, the E/M field is the much smaller of the two, and it has been lost in the shadows. In QED, E/M is itself the shadow that hides the obvious.

I will come back to QED later, but the short version is that if mass is a three-dimensional acceleration, the proton and electron will be accelerating by that equation just as will stars and planets and people. The electron orbit, no matter how complex and probabilistic it is (or is not), must express both repulsion and apparent attraction, since all relationships in the universe are a balancing of the two. QED has measured the resultant forces very accurately (all of which it assigns to E/M), but it has not yet assigned the mechanical causes of these forces in the correct way. It assumes that gravity is absent or negligible, but this is not true. QED has mis-assigned a motion, and this mis-assigned motion hides gravity at the quantum level.

But now I must return to Newton, since his equation is much easier to fix than QED. I must prove I can make the smaller fix before I tackle the larger one. I digressed into electromagnetism to show that I cannot

simply take the electrical force equation and pull it out of Newton's equation, leaving gravity without E/M. This is clear on first glance, since it is obvious to anyone that subtracting one equation from the other will leave us with something very close to zero.

Let us return to G. We have already dismissed the dimensions of G as so much fluff. They allow us to use the new dimension of mass but don't really do anything else. To put that in stronger terms, the dimensions of G *compel* us to think that mass is a new sort of dimension. Newton achieves this compulsion not by telling us what mass is, but by forcing us to give up length and time. If we used the dimensions of length and time, like Maxwell, we would think that mass is defined by motion, and Newton does not want us to do that. He wants mass to be what Einstein called "ponderable", and he does not think that motion alone can supply that. So he creates ponderability by a sort of fiat. The mass dimension stands for ponderability, therefore ponderability must exist. Not terribly rigorous, but there it is.

But now let us look at the tiny size of G. That is a fantastically small number, and to my mind it can only mean that a large amount of math has been lost. This equation of Newton is skipping entire books' worth of derivations, and is just giving us the equation on the last page of the last chapter. That number is not coming from nowhere, and therefore we must assume it is coming out of the electromagnetic field. Some E/M field equation yields that number when it meets the gravitational field, and we must find that equation.

So let us attack this problem from another direction. If we cannot easily find the E/M field equation buried here, getting it from known electrical or QED equations, then we must find a gravitational equation. I have said that Newton's equation is not how a straight gravitational field equation should look, so how should one look?

Let us say that you are an electron and I am an electron. We are both trapped in some field, so that although we may be moving very fast relative to other things, relative to eachother we are not moving. Let us also say that we believe in Einstein's theory of equivalence. That is, mathematically, a gravitational acceleration down is equivalent to a normal acceleration up. We don't have to talk about expansion or any of that here, we just need to believe in mathematical equivalence. Just as with Einstein's elevator car in space, we believe we can switch the vector and get the same answer either way. So, let us do that. We each of us have a gravity vector, and we switch it, as a game. My vector points toward you and yours points toward me. What is the force?

Given the vector reversal that Einstein allows us, there is no force of attraction. But what is the equivalent of this force? Another way of putting it is, what would be the force required to prevent us from moving toward eachother? That would have to be a force exactly the same size as the force impelling us toward eachother, if that force existed. Newton gives us that equation, and it is F = ma. If I am the little variables and you are the big, then the force to keep both of us from moving would be

$F = ma + MA$

But to keep us from getting nearer, we don't really need to include both masses in the equation. Notice that if we must stay the same distance apart, we can achieve that in two different ways. One is the way we just wrote an equation for: we keep you from moving and we keep me from moving. To keep both of our accelerations from being expressed we need ma + MA amount of force. But we can keep the distance between us the same in another way, with much less force. Say you weigh a lot more than I do, and we want to apply all our force to me instead of you. That will get your mass out of the equation. So we let you move toward me freely, and then we apply a force to me to accelerate me away from you at the same rate you are approaching. That gives us a whole different equation, but exactly the same effect.

$F = ma + mA = m(A + a)$

The first part, ma, keeps me from moving toward you. The second part, mA, pushes me away from you at the same rate you are approaching. Therefore, we stay in equilibrium.

That is the logical force for gravity, defined as it is. The force to keep gravity from working is the same as the force of gravity. To completely nullify a force, you apply an equal and opposite force. We have done that, and so we have found the size of gravity. But let us label that force in a new way, to differentiate it from Newton's F. Let us use the letter H.

$\mathbf{H = m(A + a)}$

Now, if we subtract that from Newton's equation, we should find an electromagnetic field equation.

$F = GMm/R^2$
$E = F - H$
$E = [GMm/R^2] - [m(A + a)]$
$$\mathbf{E = (m/R^2)[GM - AR^2 - aR^2]}$$

That is the E/M field equation that was buried in Newton's equation. I could manipulate it into other forms, but I won't bother with that right now. Notice that we don't need the larger mass to calculate a gravitational force, but we do need it to calculate an electromagnetic force. This is logical since we assume that both masses are creating a real bombarding field with subparticles, in order to mechanically express the E/M repulsion. We do not assume this with the gravitational field, since we are expressing the gravitational field with motion only.

I put the constant G with the larger mass, since that is why it is in the equation to start with. It acts as an electrical field transform from the mass or density of the atomic field to the density of the foundational E/M field (charge), so that the two fields can be compared correctly. Notice that if both masses are very small, G loses much of its power. If we use that equation with quanta, for example, the two acceleration terms will do most of the work, since the mass terms and G will become negligible.

Also notice that the gravitational field has nothing to do with distance of separation or with the constant G. These variables enter Newton's equation only as part of the field E. In fact, I show in another paper that G can be used directly to transform the radius of the E/M photon to the radius of the average atom in the objects. G is a SIZE transform, more than anything else.

We would expect the electromagnetic field to diminish with the inverse square of the distance. Why? Simply because our objects are spherical. If, as I have proposed and is already assumed by many, the E/M field is caused by a bombarding field of subparticles (like tiny photons), then this field will disperse simply due to the spherical way it is emitted from the surface of the body.

But we would not expect an acceleration field to diminish that way, classically, for the reason I have shown. The distance between the objects makes no possible difference, and it cannot enter the equations in a logical way.

Does this equation get the right number? Let's apply it to the Moon, as affected by the Earth. Using the values of A and a that I derive below, it gives us a total force of -9.17×10^{23}N. If we divide that by the mass of the Moon, we get
$A_E = -12.477 \text{ m/s}^2$
That offsets the total acceleration A + a, leaving a difference of $.00272\text{m/s}^2$, which is the current acceleration due to the compound field at the distance of the Moon. But if we divide by the combined mass of the Earth and Moon, instead we obtain,
$A_E = -.151\text{m/s}^2$

We divide by the combined mass because the E/M field has to repel both bodies. To counteract both accelerations, it has to work in both directions. So we have just found a number for the total acceleration of the E/M field of the Moon and Earth. I will show below that this is in fact the correct number.

I have now un-unified Newton's classical equation of gravity, showing that it is a compound equation of two force fields (or one force field and one acceleration field). But I have some work left to do, since in order to create a completely updated and modern Unified Field Theory, I have to include Relativity. Meaning, I have to express the time differential in my equations above. I will not do this with the tensor calculus. I will do it in the same way that I have solved other major problems of General Relativity: I will solve by keeping that acceleration vector pointing out and by looking at the absolute time separation between events provided by the speed of light. If you don't know what I mean by that, I recommend you to my papers on bending of starlight, Mercury's perihelion, and the Metonic Cycle, where I solve GR problems very quickly, without tensors.

In the equations above, I assumed that we were measuring from some God's eye point-of-view in the field. This is what Newton did and that is why his equation is considered classical. It also makes my equations classical. But to modernize the equations, we must measure from one defined position, and keep an eye on how light is skewing our data. Instead of measuring from "anywhere in the field" we now measure from one electron or the other. We have to choose to measure either from my perspective or your perspective, since

there is no such thing as an absolute perspective.

Since we made you bigger above, let us say you are a proton and I am an electron, and let us choose to measure from my perspective. We will measure from the electron. To solve, we will calculate how light skews each field separately, then we will join the fields back together in a re-Unified Field. This new equation will replace both Newton and Einstein (and also, at the highest levels, QED).

Let us take the gravitational field first, understood as the combined acceleration field only. How will the finite speed of light skew that problem? It will skew it since I need to know your acceleration in order to match it. In order to stay the same distance away from you and maintain equilibrium, I have to know what your acceleration is. Say you have a speedometer, and you are sending me light messages saying something like, "It is ten o'clock PM and I am going 10km/s." Well, if I am a 300,000 km away, then your message is going to be 1s late. Since you are accelerating, you aren't going to be going 10km/s one second later. Your speed will have changed a bit. If I don't make some corrections, you are going to catch me, because I am always going to be matching my speed to an old version of you. In other words, my acceleration is going to be too small, and that will be because my force is too small.

You can see that this correction is going to be pretty small, even in the example here. If we were really talking about protons and electrons, where the distance separation is tiny, the correction would be negligible. This is one reason that QED can pretty much ignore any Relativistic corrections on the gravitational acceleration field. But we need to go ahead and run the equations, since they will not be negligible in all situations at the macrolevel, as we have seen with GR.

So we return to our equation $H = m(A + a)$ and notice that A must be a received number, not a given number. It must come in as data, and that data is compromised by the time separation. So we need a transform for it. As I showed, A is arriving too small, so we need to make it a bit larger. This knowledge will help make sure we develop the proper transform. Let us define our initial velocity as zero, as if the acceleration just started when we started to measure.

$A_M = 2v_M/t$
$A_m = 2v_m/t$

$R = ct$
$t = R/c$

$v_m = v_M + A_M tR = v_M + A_M R/c$
$A_m = 2[v_M + A_M R/c\,]/t$
$A_m = 2[v_M + A_M R/c\,]/2[v_M/A_M]$
$A_m = A_M + A_M^2 R/v_M c$
$A_m = A_M\,(1 + 2R/ct)$
$\mathbf{H = m(a + A + 2AR/ct\,)}$

That is the new relativistic gravitational equation. We have to know a velocity or time for the larger mass, not just an acceleration. Obviously this is because an acceleration doesn't tell us a relative velocity. You and I could both have the same acceleration, but you would still catch me if your initial velocity was greater than mine.

You may ask, what is this a velocity or time relative to? I have assumed that R is constant, so you and I have no velocity relative to eachother. And I have I have described no other field here. The answer is that this is a velocity of the surface of the larger object relative to its center. Or, to say the same thing, it is the velocity of the surface of the larger object relative to the previous position of its surface. That is the gravitational field, once we reverse the vector. This field is exactly the same as Einstein's gravitational field, as his postulate of equivalence attests. The only difference is that his field curves and mine doesn't. So I can do this simple math and he requires tensors.

Now we have to go on and do the same thing for the E/M field. How does the finite speed of light affect that field?

$E = [GMm/R^2\,] - [m(A + a)]$

Clearly, the second term being the same, it will be affected in the same way we just found. The first term

requires a mass transform on the larger mass. We are measuring from the smaller mass, remember, so we don't need a transform on it in either term. It is a local number and can be left as-is.

The reason we need to transform the larger mass may be stated in two ways. One is that Relativity demands a mass transform, and so we better do it. This is the reasoning by authority. The better reason is one that will make sense of it much quicker, for those who find Relativity difficult (and who doesn't?). Maxwell showed how mass is L^3/T^2, and that looks just like a 3-D acceleration to me. So I treat it just like an acceleration. Therefore we transform it for the same reason and in the same way we just transformed the acceleration, because it is an acceleration.

There is one difference, however. I showed that we needed a bigger acceleration due to the time difference. But we will need to find a smaller mass. The reason is simple. In that first term we are multiplying masses. As I showed earlier, there is no reason to multiply masses to find a gravitational field. You multiply masses to compute the E/M field, and this is because you are finding a field density. That is also why you need the distance between the objects. You need to compute the bombarding force of your radiation field, and to get that you need a density. We already know that from current equations, whether Maxwell's field equations or others. Well, multiplying masses makes sense in that case, since the density is made up of radiation from both objects, and collisions are found by multiplying densities.

Anyway, this means that the distance will cause a sort of double drop-off in the force of the radiation field. We already have part of that drop-off with the inverse square of the radius. That is the classical drop-off of the field. But the field will drop-off due to Relativity, too, and the reason is that while the radiation is moving from one object to the other, the second object will have gotten bigger. According to that logic, the radiation will also get bigger, but due to Relativity all the expansions don't exactly match. Even without expansion, Relativity tells us that. We know from Einstein that masses increase and that lengths contract and that time dilates. Problem is, they don't change equally. Time and length change in inverse proportion, which basically offsets. But mass changes at a slightly different rate than length and time. You might have to go back to Einstein's transforms to verify it, but it is true whether you accept my corrections to him or not. Either using my new transforms or his old ones, mass and length transform at different rates. I have shown precisely why this is, in a simple visualization in my paper on Mercury's perihelion, but without reading that paper you will just have to take Einstein's and my word for it.

This being so, the force increases less than the mass increases, which causes the force to seem smaller once it actually arrives. This caused a 4% drop in Mercury's total perturbation, and it causes us to have to correct the mass down here. We must find less Relativistic force than classical force, and that is the way to do it here. This also mirrors Einstein, since Einstein's field equations do the same thing. He finds less force than Newton, and his change is caused by this same double drop-off, part caused by the spherical nature of the field and part caused by the time separation.

So, again, I am going to treat mass as an acceleration, and run the equations just as with acceleration, only reversing the sign.

$A_M = 2v_M/t$
$A_m = 2v_m/t$
$M_M = 2L^2v_M/t$
$M_m = 2L^2vm/t$
$v_M/t = M_M/2L^2$
$v_m/t = M_m /2L^2$
$R = ct$
$t = R/c$

$v_m = v_M - A_MtR = v_M - M_MR/L^2c$
$M_m /L^2 = 2[v_M - M_MR/L^2c]/t$
$M_m /L^2 = 2[v_M - M_MR/L^2c]// 2L^2v_M/M_M$
$M_m /L^2 = M_M/L^2 - M_M{}^2R/L^4c\ v_M$
$M_m = M_M - 2M_MR/ct$

$$\mathbf{E = (GmM/R^2)(1 - 2R/ct) - m(a + A + 2AR/ct)}$$

That's the new Relativistic E/M field equation. It describes the repulsion between any two objects. It is always in vector opposition to the gravitational force. According to this equation, no two objects attract eachother due to the E/M field, not macro-objects and not quanta. Therefore, all objects have the same charge. Any apparent attraction is only a result due to compound motions or fields.

Now let us re-unify the field.

$$F = E + H$$
$$F = (GmM/R^2)(1 - 2R/ct)$$
$$\mathbf{F = (GmM/R^2) - (2GmM/Rct)}$$

That is the new Relativistic compound equation, which can replace Einstein's equations. Einstein's field equations are updates of Newton, so his equations are also compound equations. This equation includes both the gravitational field and the E/M field. Therefore it is a Unified Field Equation. Einstein's field equations are also Unified Field Equations, and it is sad that he never realized it. He spent half his life trying to solve a problem that was mis-defined.

I have been told that if we make R=ct, that equation solves back down to Newton's equation, giving us no new information. But that misses the point. Of course it solves back down the Newton's equation. That was my whole point. Newton's equation has always been a UFT itself. All I am doing is expanding it here, to separate out the solo gravity field and the charge field, proving it is a compound equation of two fields. You can always de-expand an expanded equation. But the expansion we just discovered should look tantalizing to you, since it is a differential in a form you should recognize. It looks a lot like the Lagrangian, if you haven't noticed. More recently, I have used this unified field equation to replace the Lagrangian. See my paper Unlocking the Lagrangian to see how my UFE mirrors the Lagrangian while correcting it. See my paper on Schrodinger's Equation to see how replacing the Hamiltonian with my UFE clarifies and corrects many problems there. And see my paper on Lev Landau's orbital proof to see how replacing the Lagrangian with my UFE updates and simplifies the badly compromised textbook proof. [Also see my paper on Perturbation Theory, where I show that Newton had his own UFT/Lagrangian in a differential form that was astonishing close to correct. His biggest problem was that although he got within a whisper of the correct UFT equation, he never understood that it contained a second major field—the charge field. So, although his math led to the current (misnamed) Lagrangian, it also led to the current misunderstanding. Because Newton didn't realize his field was compound, no one else realized that until I came along.] I have also now used this relativistic unified field equation to solve the problem of galactic rotation, one of the greatest problems of current astrophysics. I develop a velocity equation straight from this UF equation, showing how the problem can be solved without either dark matter or any modified Newtonian dynamics (MOND). The problem is solved with nothing but charge.

So this re-derivation and re-expansion of Newton's equation must be very important for many reasons. Not only does it allow us to see the equation is a compound equation, but it allows us to rederive the Lagrangian, by a completely novel means. More than that, my re-derivation clears up the centuries' old misunderstandings and misinterpretations of the Lagrangian, allowing us to see the pretty simple mechanics buried there. Thanks to those such as Landau and Feynman, physics has hidden out in path integrals and other non-mechanical posturing for a long time, but my discoveries in this paper allow us to see the actual mechanics underlying the big equations like the Lagrangian and Hamiltonian.

But let us move on to more discoveries. In the thought problem above, I let one body flee the other in a line, but in real life, it rarely works out that way. In the unified field, we don't see bodies responding to one another in that fashion, do we? We see them *orbiting*. In other words, we see one body fleeing the other by using a circle or ellipse. The flight path is a closed curve. Yes, the orbit can actually be thought of as a *flight from gravity*. And what is it that allows for this flight? Said another way, what is that provides the energy for this endless flight? Newton's Innate Motion? No. We have just seen it is charge. All bodies are "attracting" one another—or moving at one another—but they are also repelling one another with this real bombardment of photons and ions. Since this bombardment is a constant force, it creates an acceleration as well. Not just a velocity, but an acceleration. So we have the balancing of **two** accelerations, in a closed curve. However, my UFT above doesn't take this curve into account. How can we include this curved motion in the equations? In a later paper I began to show you how. In short we take the time in the equation to equal $1/8^{th}$ of the orbit. This makes the tangent equal to the radius in the orbital equations, at which point we can substitue one for the other, acting as if the orbiting body is fleeing the central body in a straight line along that radius. See my papers on Newton's Lemmae and on replacing *pi* for much more on that

simplified manipulation. It allows us to solve without calculus or going to zero. It also allows us to find a velocity with the equation directly, which is of course the tangential velocity of the orbiter. Beyond that, it allows us to jettison *pi* from the circular motion equations completely, which at the same time allows us to clean up and correct them. Not only are the current circular motion equations buggy and confusing, they are actually wrong. They give us the wrong numbers—which explains why our rockets missed the Moon by large margins back in the 1950s and 60s.

To continue: Notice that R/t can be thought of as a velocity. Since the problem is gravitational, we are dealing with accelerations, not velocities. Nonetheless, we get a transform in a familiar form. 1 – (2R/ct) then becomes 1 – {2/[1 – (v/c)]}, which should look familiar to all experts on Relativity. My new unified field equation includes the Relativity transform. I remind you of that for a reason: it means the current Lagrangian is not only unified without anyone knowing it, it includes Relativity without anyone knowing it. Look back over my steps above, and notice that my UFT doesn't start to look exactly like the Lagrangian or Hamiltonian until *after* I do my simple Relativistic transforms. Until then, my expansion looks pretty humdrum. But after I do the Relatistic transforms on both terms, we get what looks like the Lagrangian, but with c expressed in the equation explicitly. This will help us a lot in later manipulations.

Before we close, let us look at a couple more things. First let us re-analyze the new E/M field equation.

$$E = (GmM/R^2)(1 - 2R/ct) - m(a + A + 2AR/ct)$$

I showed above that the mass could be treated as a sort of acceleration, according to Maxwell, and I used this equation:

$$M = AL^2$$

That gives us L^3/T^2. But let's take it even further. Notice that we have been treating the acceleration due to gravity and the acceleration due to mass as the same thing. What I mean is that the same acceleration can be used to explain the apparent gravitational attraction and the "ponderability" of the object. We don't have two accelerations here, we have one. The only difference is that in the case of mass, we add an L^2. So let's combine the two accelerations in the equation, too, and get rid of some of the redundant variables.

$$E = (GmAL^2/R^2)(1 - 2R/ct) - m(a + A + 2AR/ct)$$
$$E = mA[(GL^2/R^2) - (2GL^2/Rct) - (a/A) - (2R/ct) - 1]$$

Looks great, but what does it mean? Since we have taken L/T^2 to be the acceleration of M coming right at us (measured from the smaller mass, remember) we must take L^2 to be the motion in the other two dimensions. If we take the x-dimension as running from m to M, then L^2 is the yz plane. Since we are defining both mass and gravity as motion, this planar motion must stand for mass in that plane. If so, then it must give us the mass of the field over some infinitesimal interval and over some square "footage." The question then becomes, how big is the square and how small is the interval? That question translates into this one: Can the acceleration give us a mass? If we calculate a gravitational acceleration from our new equation, can we then use it to get a mass directly? It looks possible from here. In that case, we won't just have dimensions for Maxwell's length and time expression of mass, we will have a number.

In pursuing this number, let us first apply the new Relativistic equation to the Earth and Moon. According to Newton's equation, the force between the two should be 2×10^{20}N. According to my correction, 2GmM/Rct, where we find t in this way:

$$s = (a + A)t^2/2$$
$$t = \sqrt{[2s/(a + A)]} = \sqrt{[2(384{,}400{,}000)/(2.671 + 9.78)]} = 7855\text{s}$$
$$2GmM/Rct = 6.49 \times 10^{16}\text{N}$$

That is a .03% change due to Relativity. That works out perfectly, since, as I said, I previously found a 4% change for Mercury due to Relativity. Mercury's mass is 4.5 times that of the Moon, its density is 1.62x, and its distance is 390x.

.03% x 390 x 1.62/4.5 = 4.2%

But now let's find L for the Earth, using this equation,

$F = (GmM/R^2) - (2GmM/Rct)$

But doing the same thing to it we did to the equation for E.

$M = AL^2$
$F = (GmAL^2/R^2) - (2GmAL^2/Rct)$

To obtain a number for L, we only need the first term and our numbers that we just derived.

$GmAL^2/R^2 = 2 \times 10^{20}N$
$L = \sqrt{[(2 \times 10^{20}N)(R^2)/(GmA)]}$
$L = 7.84 \times 10^{11}m$

$M = AL^2$
$6 \times 10^{24}kg = (9.8m/s^2)(7.84 \times 10^{11}m)^2 = 6 \times 10^{24}m^3/s^2$
$1kg = 1m^3/s^2$

That works out perfectly. But it would be expected to, since we used $A = 9.8m/s^2$. Problem is, we get that number from experiment, and in experiment we are measuring a compound or resultant force. In every historical experiment to measure g, both the gravitational field and the E/M field are present. We have never tried to isolate one from the other. But we need a number for the gravitational field alone, so we will have to keep working.

In the equations above, A and a stand for raw gravitational accelerations; they are not compound numbers, expressing the resultant acceleration that also includes the E/M field. Therefore we cannot use 9.8 in those equations. This means that trying to find A from the equations we already have appears to be circular. I need another trick in order to find a variance from 9.8. We are looking for a number that is a fraction larger than 9.8, since we need to subtract the E/M field from it in order to get 9.8. That much is clear, I hope. The trick to obtain this number is in another paper of mine from last year, *The Moon Gives up a Secret*. There I do the math to find the segregated field numbers for the Moon and Earth, simply by looking at the way they are related.

I use several postulates. The first is that the gravitational acceleration is dependent only upon radius. It is not dependent on density. The density affects only the E/M field, not the gravitational field. Perhaps you will have noticed that this is one of the necessary outcomes of my math above, although I did not make it a postulate it in this paper. If we define mass in the way of Maxwell's suggestion, as L^3/T^2, then clearly mass is defined only by extension. This has the curious affect of making mass not dependent upon mass. The density of the object must now contain all idea of mass, by the old definition, and density is not necessary to calculate acceleration or gravity. So, in a way, mass is no longer necessary to calculate gravity. You only need a radius. If you also have a time, then the two together will give you the acceleration and therefore the gravitational field numbers.

The second postulate is that the E/M field drops off at $1/R^4$.** I have already shown the math for the double drop-off above. We had an inverse square law even before we made the field Relativistic (from the spherical shape of the field), then we added a second drop-off due to the time differential. The transform, as written above, does not make this clear, since I actually have an R in the numerator [1 – (2R/ct)]. But an analysis of the mechanics, as I gave above, shows that there is indeed a double drop-off due to distance.

$g_E - E_E = 9.8 \text{ m/s}^2$
$g_M - E_M = 1.62 \text{ m/s}^2$
$R_E/R_M = g_E / g_M = 3.672$
$g_M = .2723 g_E$

$E_E / E_M = 1/3.672^4 = .0055$
$E_M = 181.81 E_E$

But that last equation is assuming that the Earth and Moon have the same density. So I must now correct for density. Notice we are correcting the E/M field for density, not the gravitational field.

$D_E / D_M = 5.52/3.344 = 1.6507 = 1/.6057$
$E_M = 110.12\ E_E$

So, we just substitute:

$.2723\ g_E - 110.12\ E_E = 1.62\ m/s^2$

$g_E - E_E = 9.8\ m/s^2$

$.2723g_E - .2723E_E = 2.6685\ m/s^2$ [subtract the two equations]

$-109.85E_E = -1.0485\ m/s^2$

$E_E = .009545\ m/s^2$

$E_M = 1.051\ m/s^2$

$g_M - E_M = 1.62\ m/s^2$

$g_M = 2.671\ m/s^2$

We check that against our first postulate, and find that indeed the gravitational field is dependent on radius alone.

$R_E/R_M = g_E / g_M$
$6378.1/1738.1 = 9.81/\ g_M$
$g_M = 2.673\ m/s^2$

[In a subsequent paper I have confirmed this number $.009545\ m/s^2$ for the charge field of the earth, in an unrelated problem with unrelated math. In my paper on atmospheric pressure, I calculated an effective weight of the atmosphere, as a percentage of the gravity field. Using novel but very simple math and diagrams, I found that the force down on any gas semi-contained in the curved field of the Earth would be $.00958\ m/s^2$. Since this matches the force up, the atmosphere is effectively weightless. That these two numbers match with such simple math and postulates is one of the outstanding outcomes of my unified field theory, and I highly recommend you take the link, if you haven't already read that paper.]

So we have achieved the golden ring. We have found actual numbers for our new fields. We see that the gravitational field of the Earth must be $.009545\ m/s^2$ greater than we thought, since the rest must apply to acceleration caused by the E/M field. Even more shocking is the difference we found on the Moon. Why is the Moon's difference so much greater? It is due simply to my second postulate. Because the Moon is smaller, it is nearer in size to the E/M field it is creating. The field doesn't have as much space in which to dissipate. Because the field is created from the surface of the body, it must be exponentially denser. This is precisely why the quantum field is so strongly electromagnetic, and so weakly gravitational. The Moon, being smaller, is nearer the quantum field.

We must be surprised that the affect is so great, just moving from the Earth to the Moon. The E/M field of the Earth is only a small part of the compound field, which goes a long way to explaining why we have ignored it. But on the Moon, the numbers betray a gigantic secret, very close to home. Physicists have assumed that the Moon's field must be proportionally weaker than the Earth's, since the Moon is known to be almost non-magnetic, as a whole. But this has turned out to be spectacularly wrong. Even before my paper here, we knew that an E/M field continues to exist in the absence of the expression of its magnetic component. Venus and Mars exclude the Solar Wind just as if they had powerful magnetospheres, even though they do not. To see a fuller explanation of the Moon's E/M field, see my The Solution to Tides.

I said above that I would show that my E/M Field Equation got the right answer, and now that I have all my numbers I can show that. We found that the total E/M repulsion created an acceleration of $-.151m/s^2$. But we want to know the acceleration on the Moon only, so that we can compare it to the new numbers I just found. You will say, "Didn't we do that above already, and find 12.477? We divided by the mass of the Moon and got that number, therefore that is the acceleration applied to the Moon." Yes, in a way, but that was

comparing the acceleration to the mass, so that we could use our numbers as a correction to Newton's equation. But now we want to find the acceleration as a function of radius and density. You would think the two methods would get the same number, since mass is supposed depend on radius and density. But, Newton finds that the Moon has 1/81 times the mass of the Earth. What I want to do here is simply multiply the radius differential and the density differential, like this
$3.67 \times 1.65 = 6$
That is the number we need here, not the mass differential.

So, if the Moon's (radius x density) is 1/6 that of the Earth, then if the Moon's number is 1, the Earth's number is 6. And the total number for the combined field would be 7. But we want to give the entire effect to the Moon, keeping the Earth as a fixed point. So we multiply .151 x 7 to get $1.057 m/s^2$.

In my equations on the Moon (just above), I found that the Moon has an acceleration due to E/M at its surface of $1.051 m/s^2$, which I would call a match. My mathematical proof is complete.

Let us move from the Moon to the Earth. We have famous experimental proof of my number for the Earth's foundational E/M field. The number $.009545 \text{ m/s}^2$ is about .1% of the unified field 9.8 m/s^2. As it turns out, this is the margin of error between the Bohr magneton and the experimental value for the magnetic moment of the electron. This error has never been explained, except by tenuous *ad hoc* theories that invoke Dirac's sea of virtual particles. My unified field explains it simply and mechanically. The experimental value for the magnetic moment of the electron is .1% away from the Bohr magneton because it is measured at the surface of the Earth, where the foundational E/M field must affect it physically. Since physicists do not currently understand that this field is hidden in Newton's equation, and hidden in the gravity field, they do not include it in their math. But once we realize that the total field in any experiment on Earth is a compound field, we must include this E/M correction. The foundational E/M field causes both the electric and magnetic fields, via emitted photons and the stacked spins on these photons. So a .1% variance in the unified field will directly cause a .1% variance in the expected value for the magneton. My unified field, as seen in this paper, resolves the difference between the Bohr magneton and the magnetic moment of the electron, making the two numbers exactly the same.

Now that we have made some progress in refining the gravitational field, let us return to the E/M field. If we look for equations to compare our new equations to, we don't find any. I said earlier that I would have more to say about QED, but now the we get here, you will find that it is mostly of a negative sort. [For a more positive answer, you may now go to my paper on gravity at the quantum level and my paper on Coulomb's equation, both of which explain how the unified field works at the quantum level.] I have nothing at all to say about matrix mechanics, which, like Planck, I find "disgusting." But Schrodinger's wave equations don't give us anything either. This is because QED is not interested in describing the field as a whole, and it is especially not interested in describing the field in simple mechanical terms. It is mainly concerned with describing statistical interactions of quanta. And even when it gets beyond statistics, as with Schrodinger, it is concerned with the motions in a given field. QED mainly accepts the field of Maxwell, but adds some novel postulates that allow it to track the motions of quanta. This has many experimental uses and benefits, but theoretically it is a nearly total wash. No, it is even worse than that. QED, looked at theoretically, is worse than Maxwell's equations, since it is even more opaque.

Maxwell's equations were bad enough theoretically, since they worked mainly as a heuristic device for engineers. They include terms like permeability and permittivity and susceptibility, which are poorly defined and are given magnitude only after the fact. As a matter of theory, for instance, it is not clear that free space should have permittivity or permeability, or if it does, why it does. So Maxwell's equations are just a collection of unexplained heuristic equations. It is no wonder Einstein found them impossible to unify with anything. In addition, by the time of Maxwell we had already left the days of transparent math. The field equations are littered with complex and abstract terms, some of which still have little or no mechanical meaning. By the end of the 19th century, physics was already being inundated with operators and fluxes and Lagrangians and Hamiltonians and other action variables. The mechanical imprecision of Newton's variables had not been cleared up, it had simply been cloaked by action. In short, all the problems were buried by the creation of compound variables. Instead of a naked variable like distance or time, we now had the same variables pushed into little groups and blanketed over, to keep them out of sight. Potentials and energies were also pushed together in little tents, and the entire world became more and more abstract. And this was before the tensor and the matrix took over.

QED only added to this cloaking, and now the field does not even try to be mechanical. Quantum physicists have never been able to physically assign even their major terms, and no one is sure what the wave function

refers to, to this day. We are told that the amplitude of the wave function tells us the probability of finding a quantum in that state, but that is not mechanical, much less physical. A mathematical extension tells us an existential probability? Bosh on that. Talk about a disgusting piece of metaphysics. How could anyone ever expect to unify such garbage, and why would they want to?

To unify a field, that field has to have some meaningful axioms, and the current E/M field has very few. The fields of both Maxwell and QED are made up of equations hanging in the air from sky hooks. Neither field is defined mechanically, and neither field has transparent variables that could hope to be unified with any others. To create a field capable of unification requires a sensible field with some sensible theory underneath it, and historically we have never had that with the E/M field. I have come closer to creating a sensible field in my few short papers on the subject, but these are admittedly just the first tentative steps in that direction. First we have to redefine the basic mechanics of the field, and I have done that by demanding that the field be caused by real radiation, that it be defined by motion and collision, and that no attractions or opposite charges be allowed. Likewise, and for the same reason, we can have no messenger particles, virtual particles, or any other magic or myth. No spooky forces, no quantum leaps, no sum-over histories, no infinite renormalization, no slipshod math or logic.

What I have supplied in this paper is what we should have had to begin with—a foundation. A mathematical expression of the basic field and the basic force, in terms of simple and transparent variables. This will allow us to put in order a great deal of the heuristic equations we already have.

Up to now we have had no way to calculate the E/M field of large objects, and this may be why we have resisted admitting that the field existed for so long. We did not want to admit something existed that we had no hope of expressing in equations. The equations of Newton and Einstein gave us a big impressive gravitational field, so we stayed with what we knew. If we had known that all that impressive math already included the E/M field, we might have embraced the field long ago, on the macro-level. As it is, only the arrival of plasma research has forced us to accept the ubiquity of the field, and our lack of basic equations has caused much prejudice in that direction as well. Plasma research has not been theoretical any more than quantum research was, and this has meant that its findings did not arrive with the necessary underpinning. My equations may begin to supply some of that underpinning, or at least suggest where it may be found.

My equations above apply to the E/M field, but I have expressed only the electrical part of the field. That is the part of the field that is in vector opposition to the gravitational acceleration. The magnetic field is, as we know, orthogonal to that, so we would expect it to have no affect in the direction of gravity. However, I have assumed in other papers that the magnetic component of the field is active in solar system and orbital perturbations, since it gives us the most direct explanation of sideways shoves. Since celestial mechanics describes the interaction of all the various parallel and perpendicular shoves, it is clear that the magnetic field interacts with gravity in this way. I have not included those interactions here, but I think it is clear how they must evolve out of my theory.

I have already shown how many of the coincidences of celestial mechanics can be explained once the orbital field is shown to be a compound field, and I will continue to demystify these relationships as I can. The greatest mystery solved so far is that of the ellipse, which I have shown is completely unexplained by a solo gravitational field, but which is easily explained by a compound field of resultant forces.

*Article 5 [chapter 1] of Maxwell's *Treatise on Electricity and Magnetism*

**To see a full discussion of how this rate of absolute increase affects smaller spheres, see my paper The Solution to Tides.
